

Abstract

In order to distinguish the interactions between low oxygen and fruit developmental stages, preclimacteric and ripening-initiated with propylene avocado fruit were exposed to different low oxygen levels and the steady-state levels of protein and mRNA accumulation of selected hypoxic and ripening genes were investigated. In addition, the patterns of translatable mRNA were studied by 2D IEF/SDS-PAGE analysis in preclimacteric fruit. Analysis of mRNA populations in preclimacteric avocado fruit revealed that low oxygen levels induced new mRNA species possibly implicated in the adaptive mechanism under low oxygen, suppressed de novo synthesized ones, or left unaffected house-keeping and/or pre-existing mRNAs, indicating that the low oxygen response is complex and involves more than a simple adaptation in energy metabolism. The accumulation of cellulase protein and mRNA was irrespective of low oxygen concentrations in preclimacteric fruit and oxygen dependent in ripening-initiated fruit. That is, preclimacteric avocado fruit contained cellulase protein and mRNA which were not suppressed by low oxygen treatment. Low oxygen tensions prevented the accumulation of cellulase protein and mRNA in ripening-initiated with propylene avocado tissues. New ADH isoenzymes were present in preclimacteric and ripening-initiated avocado fruit held in low oxygen atmospheres and correlated with elevated ADH mRNA levels. Low oxygen treatment (0–5%) did not result in increased ADH activity in avocado fruit. Neither the duration of exposure nor the developmental stage of the fruit altered this pattern, suggesting that unknown factor(s) might accumulate which possibly interfere with ADH activity under such conditions.